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# Financial Sector Development and Investment in Selected ECOWAS Countries: Empirical Evidence using Heterogeneous Panel Data Method [1]

Forthcoming: Financial Innovations

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## Abstract

This study investigated the impact of financial sector development on domestic investment in selected Economic Community of West African States (ECOWAS) countries for the years 1985 to 2017. The study employed the Augmented Mean Group procedure which accounts for country specific heterogeneity and cross sectional dependence, and the Granger non-causality test robust to cross sectional dependence. The result reveals that (1) the impact of financial sector development on domestic investment depends on the measure of financial sector development utilised, (2) domestic credit to the private sector has a positive but insignificant impact on domestic investment in ECOWAS while banking intermediation efficiency (i.e. ability of the banks to transform deposits into credit) and broad money supply negatively and significant influence domestic investment, (3) cross country differences exist on the impact of financial sector development on domestic investment in the selected ECOWAS countries, and (4) domestic credit to the private sector Granger causes domestic investment in ECOWAS. The study recommends cautiousness in terms of the measure of financial development which is being utilised as a policy instrument to foster domestic investment as well as the importance of employing country-specific domestic investment policies in order to avoid blanket policy measures. Also, domestic credit to the private sector should be given priority when forecasting domestic investment into the future.

*Keywords:* Financial Sector Development; Domestic Investment; Augmented Mean Group; Granger non-causality test; ECOWAS

*JEL Classification:* C5; E2; E5; G0

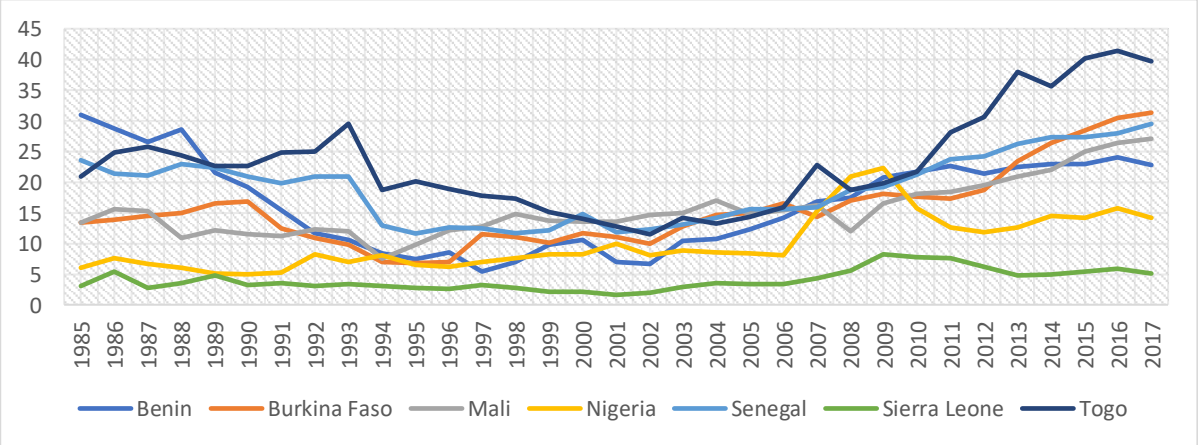
## 1. Introduction

The growth and development of every economy depends on the health conditions of various sectors in the economy. One of such sectors that can contribute towards economic growth and development is the financial sector. The development of the financial sector can be said to enhance the efficient access to financial services and products. Developments in the financial sector enable the flow of funds which drives consumption and investment thereby, increasing employment, lifting individuals out of poverty and thus improving economic performance (Tchamyou & Asongu, 2017). An efficient intermediation process and improved financial sector development increase the magnitude of domestic savings and boost the effectiveness of monetary policy in any nation or region via ensuring that scarce financial resources are channelled to paramount economic alternatives, outcomes and investments (Asongu & Odhiambo, 2019; Tchamyou, 2020).

In the Economic Community of West African States (ECOWAS), the financial sector is still developing and cloaked in defectiveness which is reflected in the difficulties faced by households and corporations to acquire or access credit. In fact, Alfaro et al. (2004), and Choong, Yusop and Soo (2004) have pointed out that inadequate development of the financial sector both in market and related institutions do restrict the readiness of an economy to enjoy the benefits accruing from Foreign Direct Investment (FDI) spillovers. The benefits of other forms of capital inflows can also be reduced as a result of an inadequate development in the financial sector.

Data for some selected ECOWAS member countries show substantial differences in the level of financial sector development as captured by domestic credit to the private sector.

Figure 1: Domestic Credit to the Private Sector (% of GDP)



Source: World Development Indicators, WDI (2019)

Of the seven countries observed in Figure 1, the level of financial sector development in Sierra Leone can be seen to be relatively low compared to other ECOWAS countries. A similar case can also be said about Nigeria on the average. Compared to other emerging countries in Africa such as South Africa and Egypt, financial sector development in ECOWAS is low. As an example, between 2001 and 2017, domestic credit to the private sector as a percentage of GDP in Egypt averaged 37 percent while in South Africa, it stood at 142 percent. However, in Nigeria, domestic credit to the private sector as a percentage of GDP averaged 13.03 percent between 2001 and 2017, and 4.85 percent in Sierra Leone within this period.

The deficiency in the financial sector in ECOWAS could reflect on the non-optimality in domestic investment levels and a poor general economic performance. Jalilian and Kirpatrick (2007), and Odhiambo (2010) highlighted some benefits of a developed financial sector which include- granting domestic enterprises access to local funds that will enable them purchase new equipment's, adopting advanced technology and enticing skilled labour, easing the credit constraint encountered by foreign companies and the ability to facilitate foreign direct investment in creating backward linkages with the rest of the economy. It is important to note that financial sector development is not only essential for investment in businesses but also has an affirmative impact on income distribution (Clarke, Xu & Zou, 2003; Tchamyou, Erreygers & Cassimon, 2019; Tchamyou, Asongu & Odhiambo, 2019), allowing the poor to invest in physical and human capital.

Contemporary growth theories (Kapur, 1976; Mathieson, 1979; Romer, 1986; Romer, 1990; Grossman & Helpman, 1991; Pagano 1993) acknowledged the affirmative function finance plays on the level of capital accumulation and savings such that savings respond positively to variations in financial variables (Oyaromade, 2005) and its influence on the rate of technological development. Investment theories such as the Tobin Q theory and the Duesenberry (1958) financial theory of investment have also acknowledged the importance of financial sector development on new investment. Hamuda et al. (2013) reveal that countries belonging to the cadre of developed nations have accumulated a substantial level of investment overtime. This is a clear reflection of the key importance of increasing investment in the ECOWAS.

While theoretical considerations suggest that financial sector development drives (domestic) investment, empirical evidence for the ECOWAS is sparse. Empirical research by Asare (2013) and Sakyi et al. (2016), has focused on the Ghanaian economy. However, this study drifts away from the highlighted studies by adopting a panel data procedure and thus accounting for more countries in the estimation procedure. This research also departs from panel data studies of similar scope (e.g. Ndikumana, 2000; Misati & Nyamongo, 2011) by utilizing a more contemporary dataset and accounting for cross sectional dependence as well as long run country-specific heterogeneity. Accordingly, it is always relevant to provide scholars and policy makers with information on nexuses among macroeconomic variables using an updated dataset in order for policy-making decisions to be informed by more updated tendencies on nexuses in the phenomena being investigated, especially in the light of taking on board long run cross-specific heterogeneities that inform more robust findings. The relevance of this study is also premised on the importance of investment in boosting economic activities which potentially have externalities on better living standards and lower poverty rates in the selected African countries. The African Development Bank (2018) has revealed that the ECOWAS region has the highest number of countries where more than 30% of the population live on less than $1.90 a day. A study by Murty and Soumya (2007) has also argued on the importance of investment on poverty reduction. The unfavourable economic conditions in ECOWAS countries have made it mandatory to identify key factors that can aid in the improvement of investment.

The study would as well capture financial sector development with three different indicators with the believe that the impact of financial sector development on domestic investment may be different depending on the measure of financial sector development utilised. This is to avoid the generalisation of issues pertaining to the subject matter. The study captures financial sector development with (1) domestic credit to the private sector, (2) bank credit to bank deposit and (3) broad money supply. The study also employs the Augmented Mean Group (AMG) estimator which is robust to cross sectional dependence which should be significantly present in ECOWAS. The remainder of the study includes a brief literature survey, methodology and data to be employed for the study, presentation and analysis of result and conclusions with relevant policy recommendations.

## 2. Literature Review

Most studies on financial sector development have concentrated on its impact on economic growth. Some of these studies include Odeniran and Udeaja (2010), Esso (2010), Kar,

Nazlioglu, and Agir (2011), Adusei (2013), Agbelenko and Kibet (2015), Abubakar, Kassim and Yusoff (2015). However, this study departs from the financial sector development and economic growth nexus and leans on how financial sector development affects domestic investment. Similar to this study, Ndikumana (2000) evaluated the effect of financial sector development on domestic investment in 30 sub-Saharan African countries in a panel data framework. Empirical results from the dynamic serial correlation model indicate that there is a positive relationship between financial sector development and domestic investment in sub-Saharan Africa. Applying an extended simple accelerator model in a smaller sample of eighteen sub-Saharan African countries, Misati and Nyamongo (2011) investigated the link between private investment and financial sector development using panel data from 1991 to 2004. They discovered that there is a negative relationship between the interest rate and private investment, indicating an enormous interest rate spreads in African economies. In addition to that, they also establish that both "credit to the private sector" and the turnover ratio have substantial links with private investment but the influence of turnover ratio on investment remained inconsequential. The triviality of the stock market pointer echoes the low stage of stock market development in most of the African economies.

The empirical evidence from a study by Asare (2013) utilising a three-stage least squares estimation technique in analysing the impact of financial liberalisation on private investment in Ghana from 1980-2007 suggested that the response of private investment to financial liberalisation is only marginal. In a similar study in Ghana, the Autoregressive and Distributed Lag (ARDL) model was employed to examine the impact of financial sector development on private investment from 1970-2014. Findings reveal that financial sector development has not been an important driver of private investment in the long run. However, in the short run, the effect of financial sector development on private investment is a function of the measure of financial sector development (Sakyi, Boachie & Immurana, 2016). The ARDL model was also applied in the study of Muyambari (2017) who examined the association between financial sector development and investment in Botswana, South Africa and Mauritius from 1976 to 2014. The study grouped financial sector development into bank-based and market-based financial sector development. Country-specific results reveal that Botswana's bank-based financial sector development impact on investment was positive in the short and long run. However, there was no impact of market-based financial sector development on investment. The investment impact of bank-based financial sector development in South Africa in the short term was identified to be negative but, revealed to

have no impact in the long term. Mauritius market-based financial sector development was the only type of financial sector development established to have a substantial affirmative effect on investment, and such was apparent just in the short term. Adopting the same ARDL model in addition to a trivariate Granger-causality technique on causal link between both bank-based and market-based financial sector development and investment from 1976 to 2014 revealed that in both models, bank-based and market-based financial sector development Granger cause investment in the short and long run (Muyambiri & Odhiambo, 2018).

Asongu (2014) employed Vector Autoregressive (VAR) technique, Vector Error Correction Model (VECM) for the long-run and short-run effects and Granger causality test respectively, to investigate the relationship between finance and investment (domestic, foreign, portfolio and total). To achieve this, the study introduced efficiency, activity, and size as omitted in earlier studies and financial depth which has been in use in other studies. The empirical result shows that finance-led investment elasticities are affirmative while investment elasticities are negative. Moreover, there was no sign of finance engendering portfolio investment in Guinea-Bissau, Mozambique and Togo, as was against the conventional evidences in literature. One of the policy implications of the result points to shortcomings in blanket policies that are not reliant on country-specific trends in the finance-investment nexus.

A structural model based on the Euler equation for investment was adopted by Love (2003) to evaluate how financial sector development and financing constraints impact growth through the efficiency of firm investment, applying firm-level data from 40 nations. The outcome shows a strong negative link between the degree of financial market development and the responsiveness of investment to the availability of internal funds (a proxy for financing constraints). Other variables like size effect, business cycles, and legal environment were considered and found plausible alternative explanations. Supporting this is Wurgler (2000) who stated that financial sector development improves resource distribution and increases the efficiency with which investment funds are redistributed across businesses as demand differs.

This study departs from existing literature by employing a more recent dataset in understanding how the financial sector affects domestic investment in selected ECOWAS countries. The study also accounts for the likelihood of cross sectional dependence which

when not accounted for, may lead to estimation bias. The reviewed panel data studies did not account for this issue.

## 3. Methodology and Data

### 3.1 Methodology

This study employs the Augmented Mean Group (AMG) estimation procedure proposed by Eberhardt and Teal (2010) which is designed for moderate number of cross sections and time periods (Nathaniel & Iheonu, 2019; Iheonu & Nwachukwu, 2020). Hence, the choice of the empirical strategy is motivated by contemporary studies on the consistency between an estimation technique and data behavior (Kou, Yang, Xiao, Chen & Alsaadi, 2019; Kou, Lu, Peng & Shi, 2012; Kou, Ergu, Chen & Lin, 2016; Kou, Peng & Wang, 2014).

Bayar (2016) reveal that the AMG accounts for cross sectional heterogeneity thereby avoiding blanket policy options by providing estimates for the individual countries, as well as taking into account cross sectional dependence in its estimation by including a common dynamic process in the modelling procedure. Oikarinen et al. (2018) acknowledge that the inclusion of a common dynamic process is aimed at removing cross sectional correlation through the identification of common trends triggered by unobservable factors. In this study, the common dynamic process is implemented with unit coefficient by subtracting it from the dependent variable. Also, the Dumitrescu and Hurlin (2012) Granger non-causality test is employed to ascertain whether financial sector development can be used to forecast domestic investment in the future. This is key in understanding future levels of domestic investment in ECOWAS.

Prior to the estimation of our econometric model, the study test for the statistical properties of the variables, beginning with the test for cross sectional dependence. Cross sectional dependence entails correlation between error terms across cross sections and in this case, across ECOWAS countries. Studies by Iheonu (2019), Iheonu et al. (2019) have revealed that ignoring cross-sectional dependence can lead to estimation bias. The study employs four tests for cross sectional dependence which includes the Breusch-Pagan Langragian Multiplier (LM) test, the Pesaran LM test, the Bias-corrected scaled LM test and the Pesaran Cross-sectional Dependence (CD) test. These four tests are employed for robustness purposes. Also, four different panel unit root tests are employed in this study, encompassing both first generation and second generation unit root tests. They include the Levin, Lin and Chu (2002), LLC panel unit root test, the Im, Pesaran and Shin (2003), IPS panel unit root test and the PP-

Fisher panel unit root test proposed by Maddala and Wu (1999) and Choi (2001). The study employs the second generation unit root test of Pesaran (2007) known as the CIPS unit root test. While the first generation unit root tests assume cross sectional independence, the second generation unit root test account for cross sectional dependence. According to Iheonu, Ihedimma and Omenihu (2017) and Agbugba, Iheonu and Onyeaka (2018), the LLC test assumes that there is a common autoregressive parameter for all cross sections while the IPS and PP-Fisher unit root tests assume a variation of the autoregressive parameters for all cross-sections.

The study then progresses to the test for long run equilibrium in the model utilising four panel cointegration tests. They include the Pedroni (1999, 2004) cointegration test, the Kao (1999) cointegration test, the Johansen-Fisher cointegration test proposed by Maddala and Wu (1999) as well as the Westerlund panel cointegration test proposed by Westerlund (2007) and further developed by Persyn and Westerlund (2008). The Pedroni, Kao and Johansen-Fisher cointegration test assumes cross sectional independence while the Westerlund test accounts for cross sectional dependence with the use of robust critical values through the process of bootstrapping.

The study leans on the financial theory of investment (Duesenberry, 1958) which recognises the role of the availability of funds when firms make investment decisions. As against the accelerator theory of investment which assume that there are unlimited funds available to a firm, the financial theory of investment assume that funds are limited and the demand for funds increases the cost of the corresponding funds. It is recognised from this theory that one of the mediums through which domestic investment can be improved is through the availability of funds as well as the ease of making the funds in the financial sector available to investors.

The study specifies an augmented mean group model where;

$$I_{it} = \varphi_1 DC_{it} + \varphi_2 BE_{it} + \varphi_3 BM_{it} + \varphi_4 GDP_{it} + \varphi_5 REM_{it} + \varepsilon_{it} \quad (1)$$

where $\varepsilon_{it} = \tau_{1i} + \lambda_i f_t + \upsilon_{it}$ (2)

$\varphi_1, \varphi_2, \varphi_3, \varphi_4, and\ \varphi_5$ represent country specific slope parameters. $\varepsilon_{it}$ encompasses the unobservables and the error terms $\upsilon_{it}$. The unobservables are made up of group fixed effects $\tau_{1i}$ which capture the time invariant heterogeneity across groups, as well as an unobserved common factor $f_t$ with heterogeneous factor loadings $\lambda_i$, which captures time invariant

heterogeneity and cross sectional dependence. This eliminates the effect of cross sectional dependence in the estimation.

here, $I$ is domestic investment, $DC$ is domestic credit, $BE$ is bank efficiency,$BM$ is broad money,$GDP$ is GDP per capita,a proxy for economic growth and included into the model in line with the accelerator theory of investment, $REM$ is personal remittances. Studies by Dash (2020), Le (2018), Yiheyis and Woldemariam (2015) have revealed the importance of remittances to domestic investment.

### 3.2 Data

The study employs data for 7 ECOWAS member countries for 1985 to 2017. The choice of the dataset is guided by data availability and methodology constraints. Particularly, the Cross-sectional Im Pesaran Shin (IPS) panel unit root test and the Westerlund (2007) panel cointegration test both require a balanced panel data. The study captures financial sector development utilising three measures. They include, (1) domestic credit to the private sector as a percentage of Gross Domestic Product (GDP), (2) bank credit to bank deposit (%) which according to the attendant literature (Tchamyou, 2019; Asongu & De Moor, 2017) measures banking intermediation efficiency and (3) broad money growth (annual %). Domestic credit to the private sector encompasses the financial resources provided to the private sector by financial corporations. Bank credit to bank deposit reflects the ability of banks to transform deposits into credit for households and economic operators (i.e. banking intermediation efficiency) while broad money captures the amount of money supply in an economy which includes both the highly liquid forms which is also known as narrow money and the less liquid forms.

Domestic investment is captured in the model by employing gross fixed capital formation, constant $US per capita. This measure is derived by dividing gross fixed capital formation by the total population of the individual countries under observation. The study utilises GDP per capita, constant $US and personal remittances (% of GDP) as controls. For ease of interpretation, domestic investment and GDP per capita are converted to their natural logarithm. Table 4.1 summarises the variables to be employed in the econometric model.

Table 1: Variables, Descriptions and Sources

| Variables | Descriptions | Sources |
|---|---|---|
| Domestic Investment (*I*) | Gross Fixed Capital Formation, constant US$ per capita | WDI (2019) |
| Domestic Credit (*DC*) | Domestic Credit to the Private Sector (% of GDP) | WDI (2019) |
| Bank Efficiency (*BE*) | Bank Credit to Bank Deposit (%) | GFDD (2019) |
| Broad Money (*BM*) | Broad Money Growth (annual %) | WDI (2019) |
| GDP per Capita (*GDP*) | GDP per Capita, Constant US$ | WDI (2019) |
| Personal Remittances (*REM*) | Personal Remittances (% of GDP) | WDI (2019) |

Source: Authors' compilation.

Notes: WDI is World Development Indicators; GFDD is Global Financial Development Database.

Countries employed in the study include: Benin, Burkina Faso, Mali, Nigeria, Senegal, Sierra Leone and Togo.

## 4. Presentation and Analysis of Results

A brief description of the variables to be employed in the study begins this section. Table 2 describes the dataset. Table 2 firstly show that there are 231 total observations. Table 2 also shows that the log of investment has an average value of 4.81, a minimum value of -0.1717 and a maximum value of 6.24. This shows that there is substantial disparity between investments in the selected West African countries. However, this disparity is not as significant as that of the measures of financial sector development. The standard deviation of domestic credit, bank credit and broad money can be observed to be 8.13, 33.46 and 17.28, respectively. This portrays a large variance of the observations across time.7

Table 2: Summary Statistics of Variables

| Variables | Mean | Minimum | Maximum | Standard Deviation | Observations |
|---|---|---|---|---|---|
| *I* | 4.8085 | -0.1717 | 6.2389 | 0.9417 | 231 |
| *DC* | 14.8534 | 1.6039 | 41.3981 | 8.1287 | 231 |
| *BE* | 87.2221 | 20.9600 | 188.5900 | 33.4607 | 231 |
| *BM* | 15.3219 | -18.0029 | 88.4006 | 17.2773 | 231 |
| *GDP* | 6.5449 | 5.6125 | 7.8489 | 0.5205 | 231 |
| *REM* | 3.6285 | 0.0035 | 10.6972 | 2.7201 | 231 |

Source: Authors' compilation

GDP and remittances have an average value of 6.55 and 3.63 respectively, a minimum value of 5.61 and 0.003 respectively and a maximum value of 7.85 and 10.69 respectively. The correlation among the variables in the model was also examined with results revealing that the regressors are not near or perfectly correlated with each other. This reveal that the issue of multicollinearity won't be a problem in our model. The result of the test for multicollinearity via the correlation matrix can be made available upon request.

Table 3 shows the result for the test for cross sectional dependence. Based on the probability value, it is observed that three out of the four tests for cross sectional dependence suggest its presence in the model at 1% level of statistical significance while the Pesaran CD test accepts the presence of cross sectional dependence at 10% statistical significant level. However, the Pesaran CD test remains biased due to the nature of the data (i.e. considering the longer time period relative to the number of cross sections).

Table 3: Cross Sectional Dependence Tests

| Tests | Statistics | Probability |
|---|---|---|
| Breusch-Pagan LM | 84.3138*** | 0.0000 |
| Pesaran scaled LM | 8.6894*** | 0.0000 |
| Bias-corrected scaled LM | 8.5801*** | 0.0000 |
| Pesaran CD | -1.8240* | 0.0681 |

Source: Authors' computation

Note: *** represents statistical significance at 1%, * represents statistical significance at 10%.

The results of the cross sectional dependence test validate the presence of cross sectional dependence among the variables in the model for the selected ECOWAS countries. This is substantially plausible due to the level of economic integration among the countries in the region.

Table 4a:Unit Root Tests Results (a)

| Variables | LLC | | | | IPS | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | | Intercept and Trend | | Intercept | | Intercept and Trend | |
| | Levels | First Diff. | Levels | First Diff. | Levels | First Diff. | Levels | First Diff. |
| *I* | 0.4833 | -6.3437*** | -2.3018** | -4.8848*** | 1.2259 | -11.2513*** | -2.8014*** | -10.2442*** |
| *DC* | 2.009 | -5.079*** | -0.701 | -4.787*** | 2.678 | -6.236*** | 1.258 | -6.696*** |
| *BE* | -3.824*** | -6.544*** | -2.039** | -5.382*** | -4.105*** | -7.271*** | -1.723** | -6.236*** |
| *BM* | -6.033*** | -10.310*** | -6.518*** | -7.958*** | -7.003*** | -13.642*** | -6.841*** | -12.285*** |
| *GDP* | 2.7422 | -2.940*** | -0.690 | -1.807*** | 4.371 | -4.987*** | -0.070 | -4.014*** |
| *REM* | -0.7666 | -6.6634*** | -1.2391 | -8.0365*** | -0.4134 | -5.5740*** | 0.3697 | -6.8468*** |

Source: Authors' computation.

Note: *** and ** represent statistical significance at 1% and 5%, respectively. *I* is Domestic Investment, *DC* is Domestic Credit, *BE* is Bank Efficiency (Credit/Deposit), *BM* is Broad Money, *GDP* is Gross Domestic Product, *REM* is Remittances. First Diff. is First Difference.

Proceeding to the test for unit root, results from Table 4a which provides the findings of the LLC and IPS unit root tests show that for the LLC test, domestic investment is stationary only after first differencing under the intercept specification while under the intercept/trend specification, domestic investment is stationary in levels and also after first differencing. The IPS test result shows that domestic investment is stationary in both levels and after first differencing in both unit root specifications. i.e. intercept and intercept/trend. In Table 4a, domestic credit is stationary only after first difference while bank credit and broad money are stationary in both levels and first difference under both intercept and intercept/trend specifications. GDP and Remittance are seen to be stationary after first difference under both unit root tests and in both unit root specifications.

Table 4b: Unit Root Test Results (b)

| Variables | PP | | | | CIPS | | | |
|---|---|---|---|---|---|---|---|---|
| | Intercept | | Intercept and Trend | | Intercept | | Intercept and Trend | |
| | Levels | First Diff. | Levels | First Diff. | Levels | First Diff. | Levels | First Diff. |
| *I* | 13.0770 | 187.717*** | 38.1283*** | 358.277*** | -2.094* | -5.610*** | -3.295*** | -5.830*** |
| *DC* | 5.577 | 128.565*** | 4.0794 | 133.762*** | -2.229** | -5.427*** | -2.291 | -5.458*** |
| *BE* | 18.322 | 59.9117*** | 5.7203 | 54.077*** | -2.589*** | -3.796*** | -2.790* | -3.697*** |
| *BM* | 111.686*** | 174.996*** | 171.231*** | 1611.05*** | -3.636*** | -5.958*** | -4.258*** | -6.158*** |
| *GDP* | 2.431 | 134.846*** | 17.736 | 127.771*** | -1.231 | -5.693*** | -2.354 | -5.870*** |
| *REM* | 14.7125 | 164.564*** | 15.2725 | 518.488*** | -1.319 | -5.933*** | -2.455 | -5.997*** |

Source: Authors' computation.

Note: ***, ** and * represents statistical significance at 1%, 5% and 10% respectively. *I* is Domestic Investment, *DC* is Domestic Credit, *BE* is Bank Efficiency (Credit/Deposit), *BM* is Broad Money, *GDP* is Gross Domestic Product, *REM* is Remittances. First Diff. is First Difference.

Table 4b presents results from the PP-Fisher and CIPS unit root tests. The results show that domestic investment is stationary after first differencing in the PP-Fisher unit root test under the intercept specification while domestic investment is stationary in both levels and after first difference under the intercept/trend specification for both unit root tests under consideration. Domestic credit under the PP-Fisher unit root test is stationary after first difference but stationary in levels and after first difference under CIPS unit root test for intercept specification. Domestic credit stationarity is achieved only after first difference for intercept and trend specification. Similar result is also seen for bank credit apart from the CIPS unit root test under the intercept/trend specification where bank credit is stationary in levels at 10% statistical level and stationary at 1% after first differencing. Further result shows that broad money is stationary both in levels and after first difference in both unit root tests and under both unit root specifications. GDP and REM are both stationary only after first difference in both unit root test and under both unit root specification.

These results with particular consideration to the CIPS unit root test shows that all the variables are stationary at first difference. This implies that it is econometrically reasonable to test for a long run relationship in the model. Table 5 present results of the Pedroni cointegration test. The result reveals the presence of cointegration in the model as it can be seen that from the 11 statistics which encompasses the within-dimension and between-

dimension, 6 statistics values support the presence of cointegration, and 5 reject the presence of cointegration.

Table 5: Cointegration Tests (Pedroni)

| Statistics | Within-Dimension (Panel) | | Between-Dimension (Group) |
|---|---|---|---|
| | Statistics | Weighted Statistics | Statistics |
| V-Statistic | -1.9183 | -0.9060 | |
| Rho-Statistic | 2.1301 | 0.0997 | 0.6765 |
| PP-Statistic | -5.5956*** | -4.0487*** | -5.3958*** |
| ADF-Statistic | -6.3521*** | -1.7493** | -1.5060* |

Source: Authors' computation

Note: ***, ** and * represents statistical significance at 1, 5 and 10%. Trend assumption: Deterministic Intercept and Trend.

Table 6: Panel Cointegration Test (Johansen Fisher and Kao)

| | Panel A: Johansen Fisher | |
|---|---|---|
| Hypothesised No. of CE(s) | Fisher Stat (Trace Test) | Fisher Stat (Maximum-eigen Test) |
| None | 211.3*** | 109.5*** |
| At most 1 | 121.0*** | 67.10*** |
| At most 2 | 64.83*** | 44.60*** |
| At most 3 | 31.69*** | 26.16** |
| At most 4 | 16.07 | 16.32 |
| At most 5 | 13.23 | 13.23 |
| | Panel B: Kao | |
| ADF t-Statistic | | P-value |
| -3.4409*** | | 0.0003 |

Source: Authors' computation

Note: *** and ** represent statistical significance at 1% & 5%, respectively. Null Hypothesis/Trend assumption in Kao: No cointegration/No deterministic trend. Trend assumption in Johansen Fisher: Linear deterministic trend.

This result is supported by both the Johansen-Fisher and Kao panel cointegration tests in Table 6. The results from the Johansen-Fisher cointegration test show that both the trace test and the maximum eigen-value test reveal that there is, at most four cointegrating equations within the model, suggesting the presence of cointegration. The result from the Kao test shows that the ADF t-statistic is significant at the 1% significance level, suggesting a strong presence of cointegration.

The results from the Westerlund cointegration test reveal four panel cointegration test results. Gt and Ga represent the group mean tests while Pa and Pt is a representation of the panel mean test which pools information over all cross sectional units and test for cointegration for the panel as a whole.

Table 7: Panel Cointegration Tests (Westerlund)

| Statistic | Value | Z-value | P-value | Robust P-value |
|---|---|---|---|---|
| Gt | -2.748 | -1.428 | 0.077 | 0.030 |
| Ga | -13.514 | -0.617 | 0.269 | 0.000 |
| Pt | -10.865 | -4.817 | 0.000 | 0.010 |
| Pa | -25.236 | -5.724 | 0.000 | 0.000 |

Source: Authors' computation

Note: Null Hypothesis: No cointegration. Gt and Ga represent group mean tests; Pa and Pt are panel mean tests.

The results show the presence of cointegration even after accounting for cross sectional dependence as can be observed via the robust p-values for all four tests which are statistically significant. The result of the cointegration tests suggests that our model can be comfortably estimated by employing the AMG which is robust to cross sectional dependence.

The results from Table 8 show that for the whole panel denoted as full, domestic credit has a positive but insignificant impact on domestic investment in ECOWAS. The positive relationship is in line with the financial theory of investment. However, banking efficiency and broad money significantly reduces domestic investment in ECOWAS. Furthermore, GDP

significantly increases domestic investment while the study does not find any significant relationship between remittances and domestic investment in ECOWAS.

Table 8: Augmented Mean Group Result

| Variables | Full | Benin | Burkina Faso | Mali | Nigeria | Senegal | Sierra Leone | Togo |
|---|---|---|---|---|---|---|---|---|
| *DC* | 0.0341 | 0.0059 | -0.0004 | 0.0098 | -0.0004 | 0.0100 | 0.2063** | 0.0072* |
| | (0.236) | (0.495) | (0.971) | (0.454) | (0.973) | (0.449) | (0.044) | (0.078) |
| *BE* | -0.0026** | -0.0016 | 0.0001 | -0.0027 | 0.0021 | -0.0062*** | -0.0036 | -0.0063*** |
| | (0.026) | (0.324) | (0.941) | (0.249) | (0.482) | (0.000) | (0.817) | (0.003) |
| *BM* | -0.0061* | -0.0023 | -0.0009 | -0.0062** | -0.0002 | -0.0017 | -0.0243*** | -0.0071*** |
| | (0.055) | (0.311) | (0.654) | (0.014) | (0.886) | (0.594) | (0.000) | (0.000) |
| *GDP* | 2.6044*** | 2.9453*** | 2.4521*** | 1.7825*** | -0.1049 | 4.1340*** | 2.9955*** | 4.0263*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.741) | (0.000) | (0.002) | (0.000) |
| *REM* | -0.0139 | 0.0101 | 0.0501* | 0.0213 | 0.0069 | -0.0962** | -0.1433 | 0.0537*** |
| | (0.627) | (0.762) | (0.060) | (0.520) | (0.751) | (0.016) | (0.364) | (0.000) |
| *C* | -11.7882*** | -14.2658*** | -10.5937*** | -6.6709*** | 6.6039*** | -22.5664*** | -14.1633** | -20.8612*** |
| | (0.001) | (0.000) | (0.000) | (0.000) | (0.007) | (0.001) | (0.014) | (0.000) |
| Wald p-value | 0.0000 | | | | | | | |
| Observations | 231 | 32 | 32 | 32 | 32 | 32 | 32 | 32 |

Source: Authors' computation.

Note: Dependent Variable- Domestic Investment (*I*). Coefficient averages are computed as outlier-robust means.***, ** and * represent statistical significance at 1%, 5% and 10%, respectively. The common dynamic process is implemented with unit coefficient by subtracting it from the dependent variable.

Country-specific results reveal that in Benin, GDP significantly improves domestic investment while remittances improve domestic investment although insignificantly. The study did not find any significant relationship between the measures of financial development and domestic investment. Also, in Burkina Faso and Nigeria, it is revealed that financial sector development do not have significant influence on domestic investment. In Mali however, broad money is revealed to reduce domestic investment significantly. Banking efficiency significantly reduces domestic investment in Senegal while domestic credit to the

private sector increases domestic investment significantly in Sierra Leone and Togo with broad money reducing domestic investment significantly in both countries.

In Burkina Faso, Mali, Senegal, Sierra Leone and Togo, GDP acts as a significant factor contributing to long run domestic investment. Remittances on the other hand, contribute substantially to domestic investment in Burkina Faso and Togo. This is in line with the findings of Dash (2020) and Le (2018). In Senegal, remittances reduce domestic investment significantly.

Table 9: Dumitrescu and Hurlin (2012) Granger Non-Causality Test

| Null Hypothesis | W-bar | Z-bar | Probability |
|---|---|---|---|
| *DC ≠>I* | 3.5726 | 4.8129 | 0.0200 |
| *BE ≠>I* | 1.2290 | 0.4283 | 0.7600 |
| *BM ≠>I* | 1.3615 | 0.6762 | 0.5200 |
| *GDP ≠I* | 6.3084 | 9.9312 | 0.0000 |
| *REM ≠>I* | 2.6061 | 3.0047 | 0.1400 |

Source: Authors' computation.

Note: Lag Order: 4. Probability values are computed using 100 bootstrap replication. The symbol '' ≠>''represents no causality between the selected variables. *DC* is Domestic Credit, *I* is Domestic Investment, *BE* is Bank Efficiency, *BM* is Broad Money, *REM* is Remittances.

In conclusion, results from the Dumitrescu and Hurlin Granger non-causality test show that domestic credit to the private sector Granger causes domestic investment in ECOWAS, while bank efficiency and broad money do not Granger cause domestic investment in ECOWAS as revealed by their insignificant p-values. It is also revealed that GDP Granger causes domestic investment in ECOWAS while remittances do not. This implies that present values of domestic credit and GDP can be utilised to forecast future values of domestic investment in the sub-region.

## 5. Conclusions, Policy Recommendations and Future Research Directions

The study has investigated the impact of financial sector development on domestic investment in the ECOWAS between 1985 and 2017. The study employed domestic credit to the private sector, bank credit to bank deposit (i.e. banking intermediation efficiency) and broad money as indicators of financial sector development. The study used the AMG

estimation procedure which has the advantage of producing country-specific results as well as an overall estimate for the panel (i.e. the ECOWAS) while still accounting for cross sectional dependence. The empirical results have revealed that the impact of financial sector development on domestic investment depends on the indicator of financial sector development. The overall result for the region under investigation revealed that bank efficiency and broad money significantly reduce the level of domestic investment in the long run while domestic credit improves domestic investment, however, insignificantly. GDP as well is essential for improvements in domestic investment in the sub-region. However, country-specific results show significant disparities on the relationship between financial sector development and domestic investment. Furthermore, results from the Granger non-causality test reveal that the domestic credit to the private sector and GDP can be utilised to forecast future values of domestic investment in ECOWAS. Based on these findings, the following recommendations are outlined, (1) policy makers should be cautious of the measures of financial sector development which are to be employed as policy instruments to foster domestic investment in the ECOWAS, (2) due to the heterogeneous nature of findings pertaining to countries making-up the sub-region, individual domestic investment policies should be employed in order to avoid blanket domestic investment policies, (3) policy makers should also aim at improving economic growth in the ECOWAS and (4) domestic credit to the private sector and GDP should be given utmost priorities in future domestic investment forecast.

The fact that banking intermediation efficiency does significantly reduce domestic investment is however not consistent with studies such as Fouda (2009) and Asongu (2014a). These studies have found insignificance in the relation between banking intermediation efficiency and domestic investment. This however is due to the fact that Fouda (2009) concentrated on the Central African Economic and Monetary Community (CEMAC) and Asongu (2014) employed time series methodologies with data ending in 2008. One of the major reasons is due to inability of banks to transform mobilised deposits into credit for corporations and households. Also, bottlenecks and inefficiencies in the banking system in these West African countries may impede credit to corporations and households. As a future research direction, repositioning this study in the light of the feasibility of the potential West African Monetary Zone is timely given that the proposed ECO (ECOWAS common currency) is to be launched in 2020.

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